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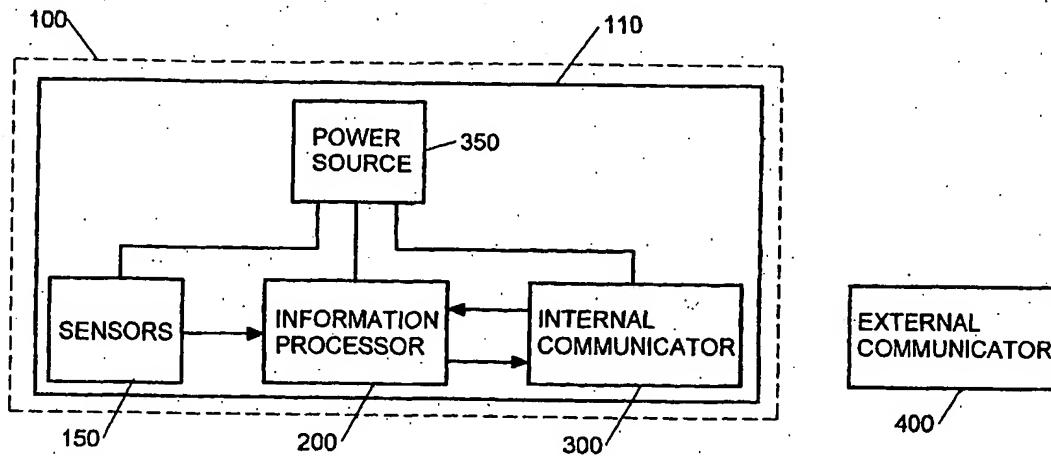
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(54) Title: METHODS AND APPARATUS FOR OBTAINING DATA FOR PROCESS OPERATION, OPTIMIZATION, MONITORING, AND CONTROL



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(57) Abstract: Data are collected for deriving response models and information required for developing and maintaining processes and process tools. Methods and apparatus for collecting the data include a sensor apparatus (100) capable of collecting data with less perturbation and fewer disruptions than is usually possible using standard methods. The sensor apparatus is capable of being loaded into a process tool. From within the process tool, one embodiment of the sensor apparatus is capable of measuring data, processing data, storing data, and transmitting data. The sensor apparatus has capabilities for near real time data collection and communication.

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|----------|----------------------------------------------------------------------------------------------------|--------------------------|
| X | US 5 389 769 A (YAMASHITA TEPPEI ET AL) 14 February 1995 (1995-02-14) the whole document | 1,2,5, 7-27, 32-35 |
| X | DE 43 27 342 A (AEG SENSORSYSTEME GMBH) 23 February 1995 (1995-02-23) | 1,2,5, 7-27, 32-35 |
| Y | the whole document | 4,6 |
| Y | US 5 526 293 A (MOZUMDER PURNENDU K ET AL) 11 June 1996 (1996-06-11) abstract | 4 |
| Y | EP 0 337 669 A (RENISHAW PLC) 18 October 1989 (1989-10-18) abstract | 6 |
| | | -/- |

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Patent family members are listed in annex.

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ational Application No

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| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|------------------------------------------------------|--------------------------------------------------------------------------------------------------------|-----------------------|
| Category | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| A | WO 00 02236 A (MEMC ELECTRONIC MATERIALS) 13 January 2000 (2000-01-13) abstract | 1-35 |
| A | WO 99 31713 A (JENOPTIK JENA GMBH) 24 June 1999 (1999-06-24) abstract | 1-35 |
| A | US 5 866 024 A (DE VILLENEUVE THIERRY) 2 February 1999 (1999-02-02) abstract | 1-35 |
| A | WO 90 05960 A (CRYPTAG LIMITED ; DEMIC SCIENT LIMITED (GB)) 31 May 1990 (1990-05-31) abstract | 1-35 |
| A | GB 2 141 365 A (GTE VALERON CORP) 19 December 1984 (1984-12-19) abstract | 1-35 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/26315

| Patent document cited in search report | | Publication date | | Patent family member(s) | | Publication date |
|----------------------------------------|---|------------------|----|-------------------------|--|------------------|
| US 5389769 | A | 14-02-1995 | JP | 3216205 B2 | | 09-10-2001 |
| | | | JP | 5275296 A | | 22-10-1993 |
| | | | DE | 69325840 D1 | | 09-09-1999 |
| | | | DE | 69325840 T2 | | 25-11-1999 |
| | | | EP | 0562622 A1 | | 29-09-1993 |
| | | | TW | 423709 Y | | 21-02-2001 |
| DE 4327342 | A | 23-02-1995 | DE | 4327342 A1 | | 23-02-1995 |
| US 5526293 | A | 11-06-1996 | US | 5661669 A | | 26-08-1997 |
| EP 0337669 | A | 18-10-1989 | DE | 68916463 D1 | | 04-08-1994 |
| | | | DE | 68916463 T2 | | 17-11-1994 |
| | | | EP | 0337669 A2 | | 18-10-1989 |
| | | | JP | 2021794 A | | 24-01-1990 |
| | | | JP | 2994401 B2 | | 27-12-1999 |
| | | | US | 5150529 A | | 29-09-1992 |
| | | | EP | 0337670 A2 | | 18-10-1989 |
| | | | JP | 2015733 A | | 19-01-1990 |
| WO 0002236 | A | 13-01-2000 | TW | 452829 B | | 01-09-2001 |
| | | | WO | 0002236 A2 | | 13-01-2000 |
| | | | US | 6330971 B1 | | 18-12-2001 |
| WO 9931713 | A | 24-06-1999 | US | 6418352 B1 | | 09-07-2002 |
| | | | EP | 1040511 A2 | | 04-10-2000 |
| | | | WO | 9931713 A2 | | 24-06-1999 |
| | | | JP | 2002509352 T | | 26-03-2002 |
| | | | TW | 445418 B | | 11-07-2001 |
| US 5866024 | A | 02-02-1999 | FR | 2743194 A1 | | 04-07-1997 |
| | | | EP | 0782001 A1 | | 02-07-1997 |
| | | | JP | 9190519 A | | 22-07-1997 |
| WO 9005960 | A | 31-05-1990 | WO | 9005960 A1 | | 31-05-1990 |
| GB 2141365 | A | 19-12-1984 | AU | 555481 B2 | | 25-09-1986 |
| | | | AU | 2759584 A | | 20-12-1984 |
| | | | BE | 899915 A1 | | 01-10-1984 |
| | | | CA | 1237178 A1 | | 24-05-1988 |
| | | | CH | 669842 A5 | | 14-04-1989 |
| | | | DE | 3422181 A1 | | 20-12-1984 |
| | | | FR | 2548349 A1 | | 04-01-1985 |
| | | | IT | 1209553 B | | 30-08-1989 |
| | | | JP | 60013202 A | | 23-01-1985 |
| | | | KR | 9002677 B1 | | 23-04-1990 |
| | | | MX | 158057 A | | 29-12-1988 |
| | | | NL | 8401874 A ,B, | | 02-01-1985 |
| | | | SE | 457336 B | | 19-12-1988 |
| | | | SE | 8403156 A | | 15-12-1984 |
| | | | US | 4779319 A | | 25-10-1988 |
| | | | US | 4978857 A | | 18-12-1990 |
| | | | US | 5065035 A | | 12-11-1991 |
| | | | ZA | 8403832 A | | 29-01-1986 |